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Chemical Sources and Sinks of OCS in the Lower Atmosphere and on the Surface of Venus

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Venus Express provides quantitative constraints on the concentration profiles (in height and latitude) of OCS. A 2-D model that is consistent with the observations suggests that the global rate of destruction of OCS is $\sim$ 3000 Tg-S/yr, a value that should be compared to the total volcanic source of $\sim$10 Tg-S/yr for the Earth. The atmosphere is a net sink for OCS. Destruction by photolysis appears to be insufficient; possible catalytic and heterogeneous reactions are suggested. We argue that the large implied source of OCS is unlikely to be supplied by volcanic emission. It is most likely that OCS is produced by heterogeneous reactions on the surface from CO and polysulfur (Sx), or between CO and CO2 and surface minerals (e.g. pyrite). New laboratory experiments are urgently needed to advance our understanding of sulfur chemistry on Venus.